



832 examined.---

line 2, change "characteristics of the preamble to claim 1, as well as" to "the present invention also relates---";

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line 7, insert the following:

---2. Discussion of Background Information---; and

line 8, change "characteristics of the preamble to claim 1" to ---above-noted features---

Page 2, line 7, change "consists of the fact" to ---is---

Page 4, line 31, change "consists of the fact" to ---is---

Page 5, line 3, insert the following:

---SUMMARY OF THE INVENTION---

833 line 9, change "the object is attained by means of the" to ---the test object is stationary during the inspection process while the X-ray beam tube and the detector are moveably arranged within the X-Y plane for inspecting the entire area of the test object.---

line 10, delete "characterizing portion of claim 1.";

834 line 11, delete "use of"; change "device" to ---device,---; and change "is provided in claim 10. The preferred" to ---can be used for X-ray inspection of soldered joints on printed circuit boards and/or loaded printed board assemblies.---; and

line 12, delete in its entirety.

Page 6, line 9, delete "1.";

line 26, delete "2."; and

line 30, change "3. Since always" to ---Since---

Page 7, line 5, delete "4.";

line 9, delete "5.";

line 11, delete "also";

line 14, delete "6.";

✓
line 17, delete "6.";

✓
line 26, delete "7.";

✓
line 29, change "does it require require the" to ---a---; and

✓
line 30, change "tube." to ---tube is required in the instant invention.---.

✓
Page 8, line 1, delete "8.".

✓
Page 9, line 3, insert the following:

B^s
---The present invention is directed to a device for inspecting at least one test object that includes an X-ray beam tube having a small field of view in relation to a horizontal extent of an area of the at least one test object to be inspected, and a detector having a small field of view in relation to the horizontal extent of the area of the at least one test object to be inspected. The at least one test object is stationary during the inspection, and the X-ray beam tube and the detector are moveably arranged within an X-Y plane for inspecting an entire area of the at least one test object.

In accordance with a feature of the present invention, a carrier can be adapted to be fixedly mounted during the inspection of the at least one test object. The carrier may be coupled to the at least one test object during the inspection.

According to another feature of the instant invention, a computing device can be coupled connected to the detector. Further, an analysis unit may be connected to the computing device.

According to a further feature of the invention, the X-ray beam tube includes a microfocus tube with a focal spot diameter of 10 to 40 μm .

In accordance with still another feature of the instant invention, the detector can include a CCD chip arranged on a taper.

The X-ray beam tube and the detector can be adapted for two-dimensional inspection of the test object. Further, the X-ray beam tube and the detector may be adapted for three-dimensional inspection of the at least one test object.

In accordance with a still further feature of the instant invention, the at least one test object can include at least one of a printed circuit board and a loaded printed board assembly.

According to another feature of the present invention, the device is adapted for X-ray inspection of soldered joints on at least one of printed circuit boards and loaded printed board assemblies.

Moreover, the device can be adapted for fully automated 100% X-ray inspection of soldered joints on at least one of printed circuit boards and loaded printed board assemblies.

B⁵ Further, an analysis unit can be coupled to the detector, and the analysis unit can include a learning mode. In the learning mode, a set of testing algorithms can be transmitted to the analysis unit, and the algorithms are used to generate a characteristic vector for an individual soldered joint that is optimized to statistically represent a defect-free soldered joint. The characteristic vector can be optimized by analyzing vectors of a same soldered joint on other at least one of printed circuit boards and loaded printed board assemblies. The analysis unit can also include a testing mode. In the testing mode, a pad image buffer, the set of testing algorithms, and the learned characteristic vectors with tolerances can be transmitted to the analysis unit, and, in order to test a soldered joint, a correlation between the learned characteristic vectors with tolerances and the soldered joint under test can be determined.

According to a further feature of the instant invention, the X-ray beam tube and the detector can be adapted to move parallel to each other. Further, the X-ray beam tube and the detector may be adapted to move together in a same direction; to move in a same direction; or to move in opposite directions.

The X-ray beam tube and the detector can be adapted to move parallel to the at least one test object.

The invention is directed to a process of inspecting at least one test object with an apparatus that includes an X-ray beam tube having a small field of view in relation to a